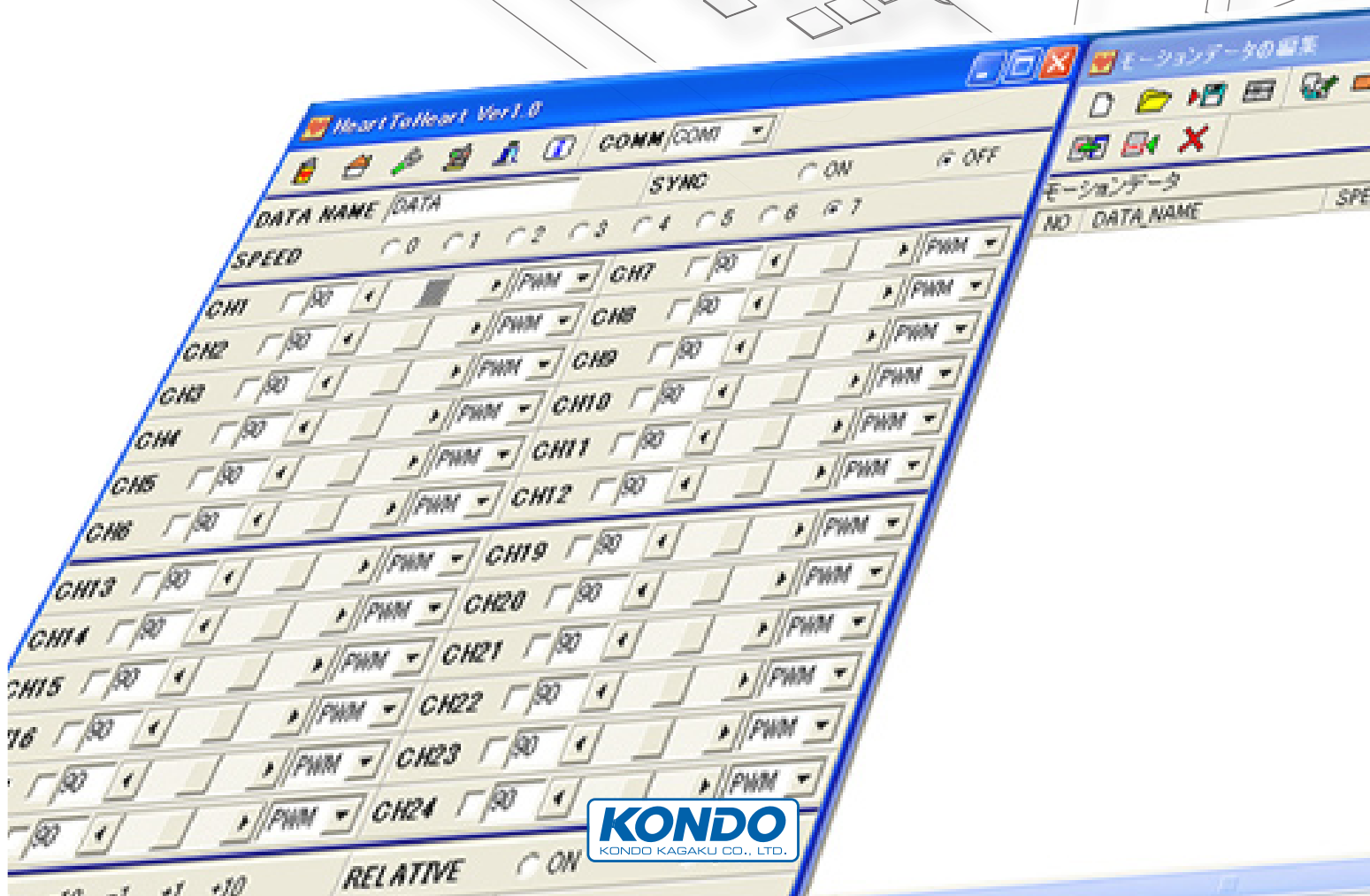


RCB-1

Software Manual



Preface

Thank you for buying our product.

Please read carefully to use this product safety and full functions.

We recommend to copy this manual haddisks on your PC or to print out to refer, if you need.

Contents

This manual describes RCB-1 as robot control board, and HeartToHeart as control software.

Please read hardware manual before this manual if you have robot kit KHR-1.

The information and specifications in this manual are subject to change without notice.

<http://www/kondo-robot.com>

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You may not reproduce, republish, post, transmit or distribute any Materials without permission.

First of all, you should read hardware manual if you want to use this manual for KHR-1 (robot kit).

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About Product

RCB-1

RCB-1 is the servo motor control board.

A RCB-1 can control 12 servo motors. And also, two boards can be linked to control 24 servo motors.

The board supports all functions of Red version of our servo motor.

You can make advanced robot with our products.

HeartToHeart Version 1.1

HeartToHeart version 1.1 is motion editor for RCB-1. This software supports all functions of RCB-1. Add to say, you can use teaching function if you attached Red version servo motor on your robot. It makes possible to easy edition of motions.

Descriptions

This manual describes procedure of editing motion using robot control board RCB-1. RCB-1 and software works together. Please read this manual carefully.

Introduction

Installation of software to your PC.

Software Install

First of all, software is copied from CD-ROM to hard disk on your PC.

1 Insert CD-ROM to CD-ROM drive

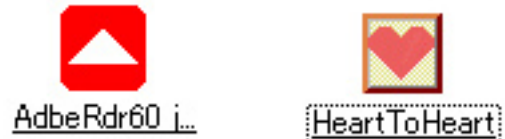
2 Open CD-ROM drive from "my computer"

Open "software" folder in CD-ROM folder.



3 Copy "HeartToHeart" file in "software" folder to hard disk on your PC.

Please make new folder for this software in hard disk.



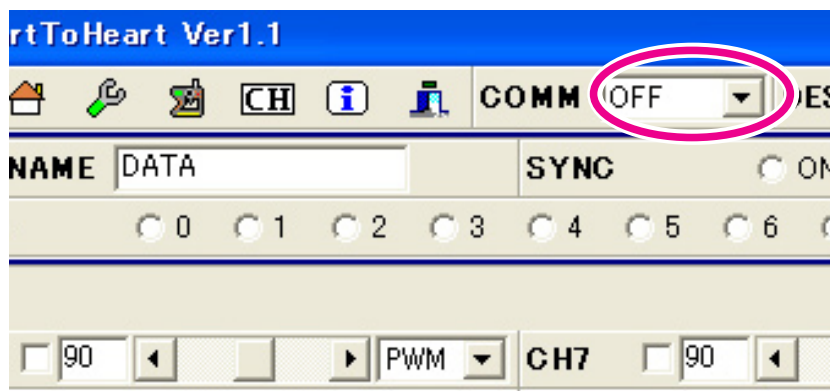
4 It is easy to open "HeartToHeart" if you make short cut icon on the desktop.

**In order to use software, it is necessary to look at the upper procedure and to copy a file in a hard disk.
Keep in mind that it does not get used to use normally when the file in CD-ROM is performed.**

In the case of uninstall the software. Delete all files concerned with this software including folder.

Software Initialize

RS232C Port



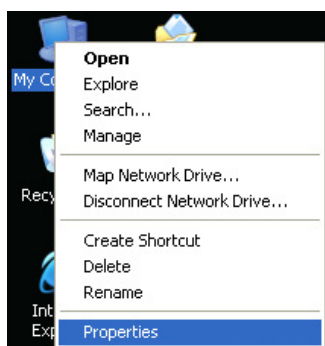
HeartToHeart uses RS232C to access RCB-1.

Default setting of RS232C is "OFF". You must set the number of COM port on your PC at first.

Please pay attention to the number of COM port if you use USB-RS232C adapter.

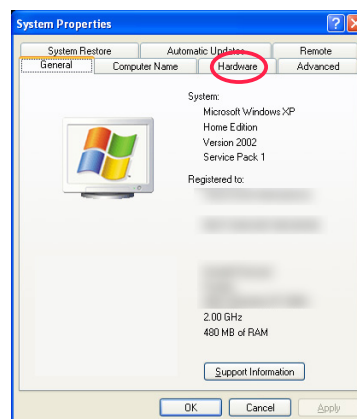
How to confirm RS232C port number

In this manual, we use Windows XP as example. Please refer to windows manual if you have any other version.



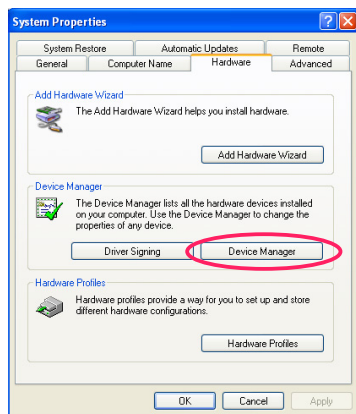
1

Click right button on "my computer" icon on the desktop.



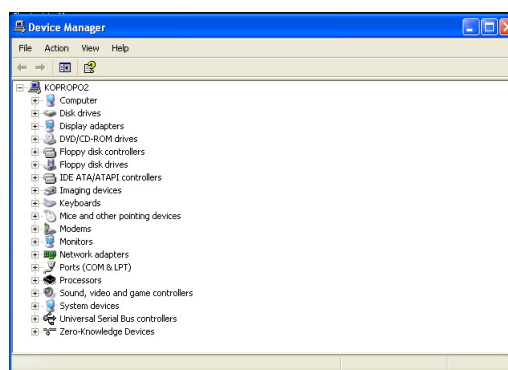
2

Property window is displayed. Click "hardware" tab in this window.



3

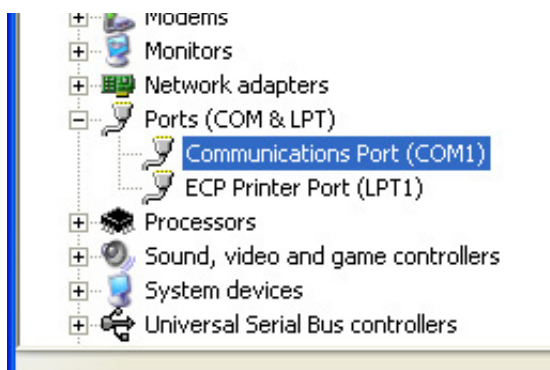
"hardware" tab is displayed. Click "device manager" in this window.



4

"device manager" is displayed. Click "+" on the line "Port (COM and LPT)".

Ports are shown by this operation.



In this case, we can see COM1 and COM2 as serial port.

Please set the number of the cable which attached to the PC and RCB-1.

※This information will show no COM ports if PC confirmed any serial cables or USB-RS232C adapter.

Names and Functions

Continuous performance is made from a set of positions. We use words "position", "motion" and "scenario" to make performance.

Position and Motion

"position" is a set of position data of each servo motor in shape of robot at presence.

Software can set data to each servo motor using teaching function or slide bar.

"motion" is a set of position.

Change of position to position is set by speed. Depending on the set value, performance between positions is compensated automatically.

RCB-1 can save 100 positions for a motion. And also, RCB-1 can save 40 motions.

Scenario

We use scenario to make performance of robot. Of course we can set performance to describe each motion. RCB-1 can save 4 scenario. We call "bank" as the place to save a scenario.

A scenario can keep 200 motion data. (It means that scenario can use motions repeatedly. Because motion can save only 40 data.)

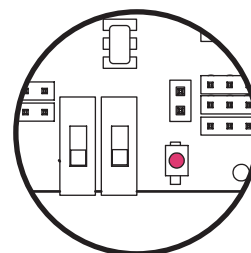
Scenario in Bank 0

Scenarios are saved to bank from #0 to #3. Bank #0 is the special record.

Bank #0 has auto demonstration mode if you turn on the start switch on RCB-1.

Of course Bank #0 can be used for normal scenario mode.

This function supports auto demonstration of the robot.



Start Switch

Home Position

Home position is the most important position to the robot.

Because it is the basement position of the robot.

Usually, we call home position as "standing position". However, home position will be taken for long time in various positions. We should keep the shape of robot which has less load.

In the case of KHR-1, please set home position referring to hardware manual.

※All data in the software refers to home position as the basement position. You can replay almost same position in the sample data if you set the same home position.

Software Reference

Software consists of

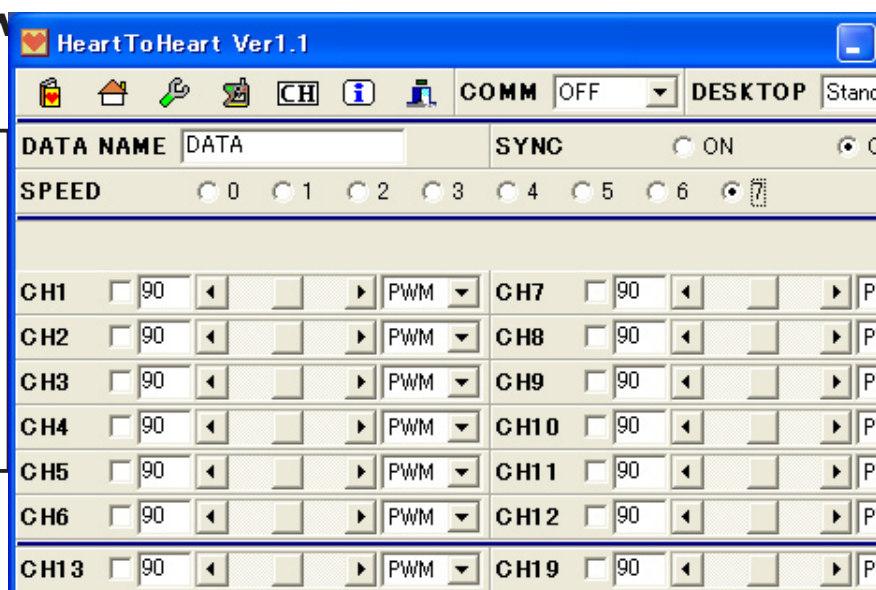
- **Main window,**
- **Motion editor,**
- **Scenario editor, and**
- **Graph window.**

Each name or function is described in this reference.

Main window (1)

Icons on the upper window

Main window is the first window if you start the software. It is the main software to set value to the servo motor with slide bar and to support various functions.



Scenario Editor

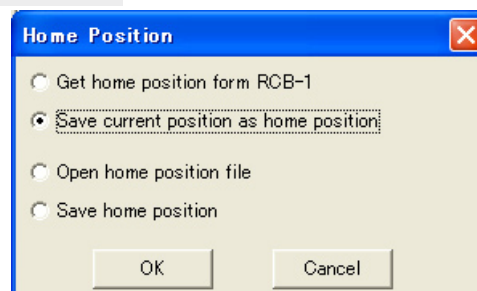


This icon opens scenario editor. Refer to "Edit scenario" for details.

Home Position



This icon opens home position window. This window save each value on the displayed window as home position to RCB-1.



Option Setting



This icon opens option setting window. Option means ID setting to RCB-1 and Trim setting(read/write).

Option controller setting



This icon opens optional controller. Optional controller will be on sale in the future.

Label property



This icon opens label setting window. This window can set name to each channel, color, and display mode ON/OFF.

Close



This icon exit software.

Information



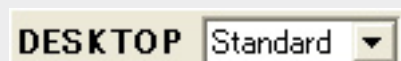
This icon shows version information.

Serial port number setting



This function set the number of serial port on your PC. Default setting is "OFF". You must set the number of the serial port before access to RCB-1. Please refer to "How to confirm RS232C port number" for details.

Desktop



You can change location of each channel from ch1 to ch24 by drug and drop on the window. And also, you can keep 10 locations using this desktop function.

Main window (2)

Setting Items

Positon name

DATA NAME DATA

This function gives a name to data (position) in presence. It is used to show to make motion.

Synchronization

SYNC ☐ ON ☒ OFF

This function sets synchronization between this software and RCB-1. RCB-1 works according to the slide bar movement in realtime if the setting is ON. In the case of OFF, RCB-1 doesn't work in realtime.

Speed

This function sets motion speed. 0 is the fastest speed. 7 is the latest speed.

SPEED ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7

Servo Control

Tracking check

It can increase or decrease data simultaneously using "tracking" button if this check box is ON.

CH1 ☒ 90 Slide bar

This bar sets data to each servo motor according to the channel number. Slide bar changes data by user operation. You can see synchronized movement of servo motor and

slide bar movement if "sync" is ON. The setting value is absolute value from 0 to 180. You can set "relative" to home position if you set ON to "RELATIVE" setting.

Label

Each channel is shown with number from CH1. You can give a label to the channel if the name is double clicked to open a window to revise.

For example, you can give a name to CH1 on KHR-1.

R. Hand ☐ 90

Mode setting

This function sets signal mode to channel output.

PWM
PWM
FREE
SET1
SET2
SET3
-L-
-H-

PWM : Default setting. Position control mode. Value is set from 0 to 180 by slide bar.

FERR : Servo motor is free.

SET1~3 : 3 values are changed. 3 values are set by ICS function.

-L- : output TTL low level

-H- : output TTL high level

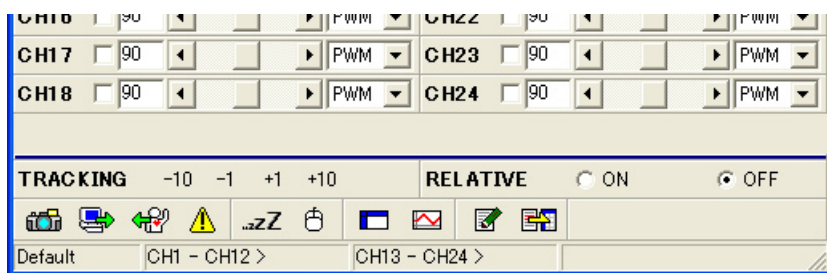
※FREE and SET1-3 can be available if you use Red version servo motor. Don't use these modes if you have no red version servo motor. It is danger. Because normal servo motor for radio control car doesn't have this function.

※Please set FREE to channel which is not attached servo motor.

※Don't set -L- or -H- to channel which is attached servo motor. It is danger. Because servo motor has no function to support -L- or -H- mode.

Main window (3)

Icons on the lower window



TRACKING -10 -1 +1 +10

TRACKING

This function increase/decrease setting value simultaneously to each channel if the channel tracking check box is ON.

RELATIVE ☒ ON ☐ OFF

RELATIVE

Each channel data is displayed by absolute value. It shows relative value if the radio button is "ON". It is relative to home position.

CH1 ☐ 0

※You must read home position from RCB-1 before use this ction.



Shot Button

This button opens window for teaching function.



Data Transmit

This button sends data to RCB-1. It is used in the case of "OFF" mode of "SYNC".



Read Data

This button reads RCB-1 data at presence. (The data is only position. Motion and scenario are not included.)



Home position

This button sets home position which is set in RCB-1. Frist click set to free all servo. Second click to set home position after check dialog box.



Sleep

This button sets sleep mode to RCB-1.Each servo is set free. But RCB-1 and PC can be access each other.To keep battery, it is better to use when you save motion or scenario data to RCB-1.



Default

This icon turns on RCB-1 from sleep mode.



Edit motion data

This icon opens/closes motion editor window.



Graph Window

This icon opens/closes graph window.



Add data

This icon adds data in the window at presence to motion.
Data is added to the last of the motion.

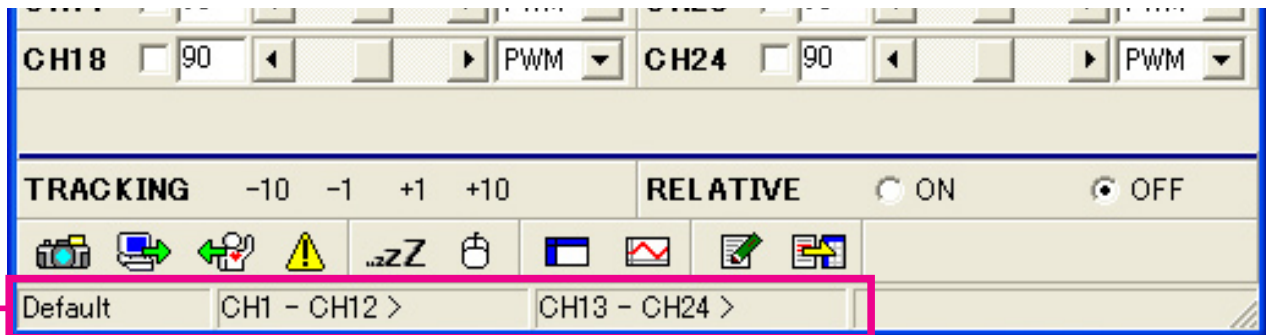


Override data

This icon override selected data in the motion editor with data on the main window.
Pay attention: original data will be deleted by this operation.

Main window (4)

Information



The bottom on the window shows status.

- Default/Sleep: icons set RCB-1 mode Active / Sleep. Default setting is "Default".
- Access status: This software accesses to 2 boards. It shows status of access. Normal display is "success" for each access.

※In the case of failure to access, please confirm COM port setting.
Especially, USB-RS232C adapter changes the port number if you remove/attach USB-RS232C adapter during operation.

NOTICE


About Data Save

- You can't save only position which set on the main window. You must save "motion" which includes the position.
- Data which is used to change DESKTOP is location of servo control. Display/No Display mode and color are displayed the same setting after save to system in the label property setting.
- Each label name which is set in the label property is saved in "SYSTEM". However, label names are deleted when the data is send to RCB-1. Add to say, read data from RCB-1 is set as the label name which is the setting name in the presence on the main window.


Motion Editor Icons

**This window is opened by clicking the "Motion Editor" icon.
This function makes motion using a set of positions.**


New data

 It makes new data. It clears all information on the window.


File Open

 This icon opens a window to open a file.


Save

 This icon saves data to a file.


Undo

 This icon undoes the width of display data.


Copy

 This icon copies selected data.


Cut

 This icon cuts selected data.


Paste

 This icon pastes copied / cut data.


Write

 This icon writes editing data to RCB-1 with the selected number.


Read

 This icon reads data from RCB-1. The number of motion can be selected using "Selection of Data number".

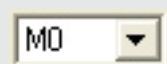
Delete

 This icon deletes data on RCB-1 which is selected using "Selection of Data number".


Play data

 This icon plays RCB-1 data which is selected using "Selection of Data number".
※It plays saved data on RCB-1.


Selection of Data number

 This function sets the motion data number on RCB-1.


Edit

 This icon copies selected data in the data window to the main window.

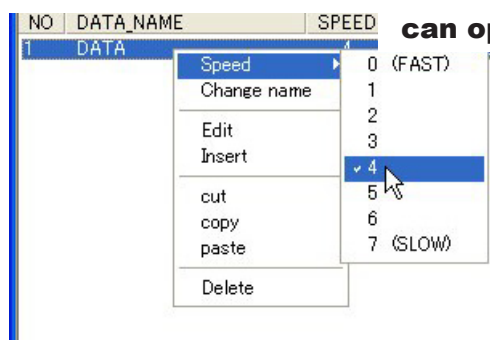
Insert

 This icon inserts new position data.

Delete data

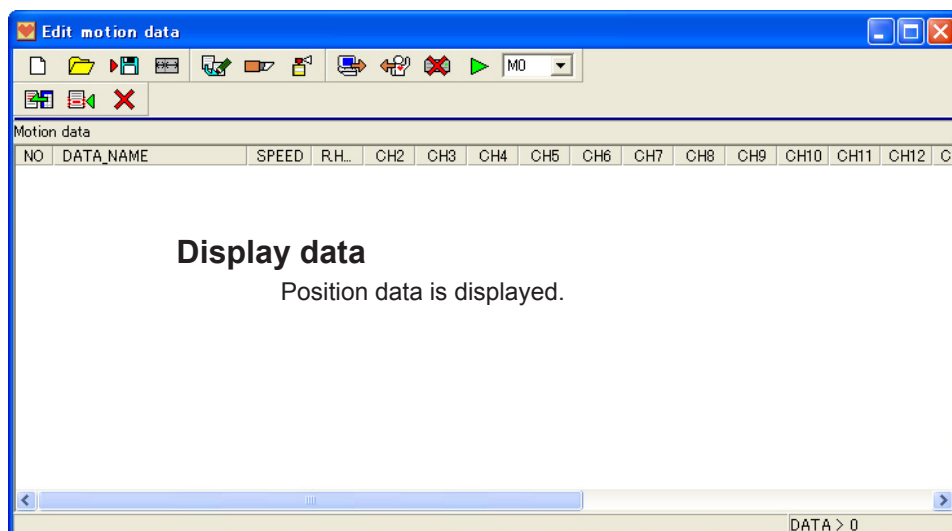
 This icon deletes selected data.

Menu is shown by clicking the right button in the data window. You can operate using this menu.



※You can edit only speed in the data window. Click the edit button or double-click on the data to revise data using the main window. After edit, please override the data.

※You can change to display motion editor and main window.



Display data

Position data is displayed.

Scenario Editor Icons

Scenario plays motions continuously. This window can be opened by clicking the "Scenario Editor" icon.

Read All Motion Data



It shows all motion data after reading motion data in the memory of RCB-1.

New



It makes new data. It clears all information on the window.

File Open



This icon opens a window to open a file.

Save



This icon saves data to file.

Undo



This icon undoes width of display data which is changed.

Copy



This icon copies selected data.

Cut



This icon cuts selected data.

Paste



This icon pastes copied / cut data.

Bring Data to lower column



This icon moves selected data to lower line.

Bring Data to upper column



This icon moves selected data to upper line.

Delete data



Selected motion data is deleted from scenario.

Write data



Editing scenario data is written to the number which is set by "Selection of data number".

Read data



This icon reads scenario data from RCB-1. It can be set by "Selection of data number".

Delete data



This icon deletes motion from selected scenario data.

Play data

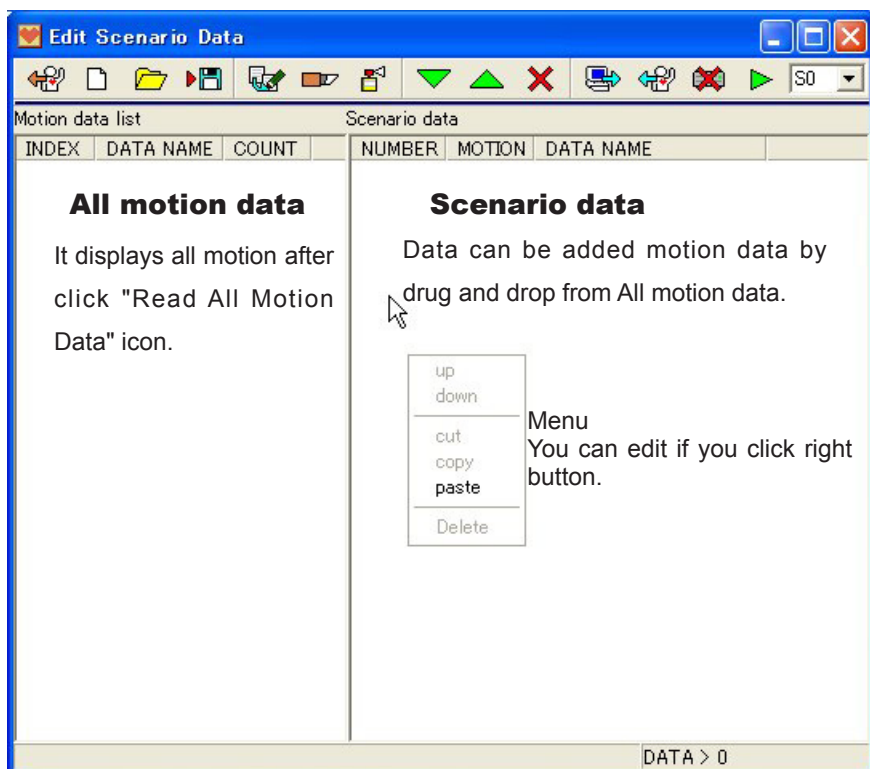


This icon plays data in RCB-1 which is set by "Selection of data number".

Selection of data number



It sets data number in RCB-1. Scenario can use number from S0 to S3.



※Main window and Motion window can not be edited if scenario window is opened.

Hardware must be set before access using software.

H a r d w a r e

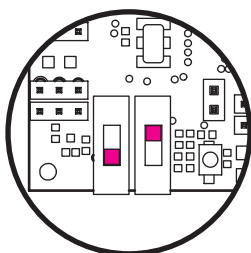
Initialize RCB-1

ID setting

KHR-1 uses 2 RCB-1 boards. To distinguish each board, a board must have ID number. Both boards are set ID0 when they are shipped. One of the boards must be changed ID1 from ID0.

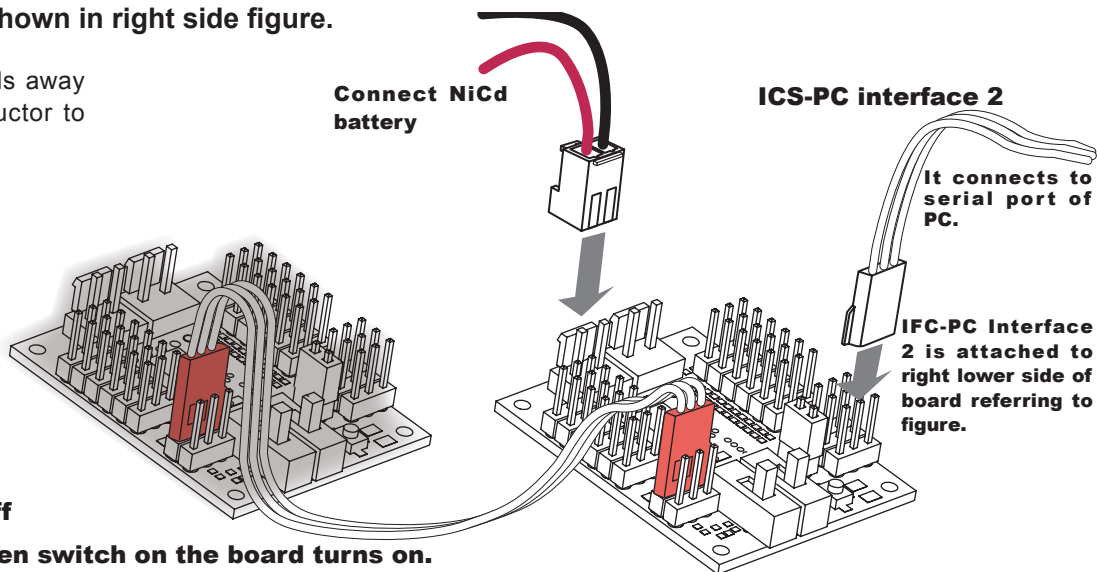
Boards connection is shown in right side figure.

*Attention: Keep boards away from an electric conductor to avoid short circuit.



Switth to turn on/off

Start software in PC then switch on the board turns on.



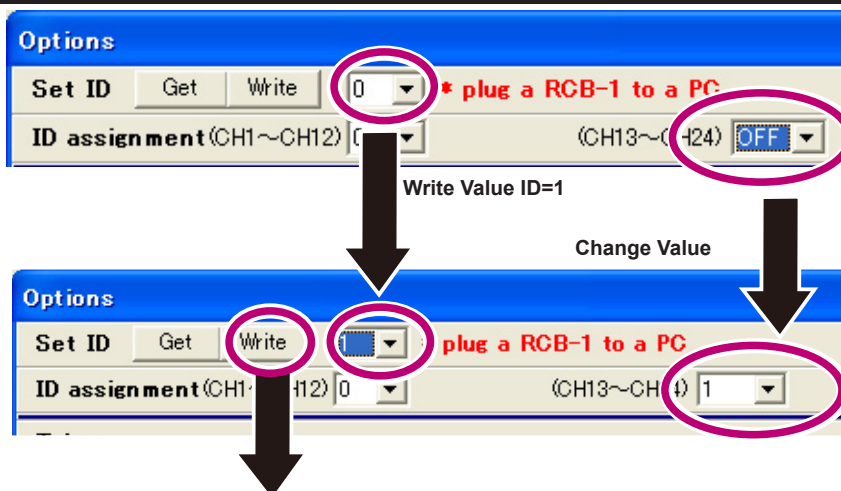
Main window

Set ID number using software.



Option setting window

*A board which attached IFC-PC interface 2 cable is the target board to change ID number. In the software, it describes PC and a board should be attached to change ID. You can ignore it.



At last, click "Write" button to set ID number to board.

After setting, close software then switch on the board turns off.

RCB-1 cable assignment

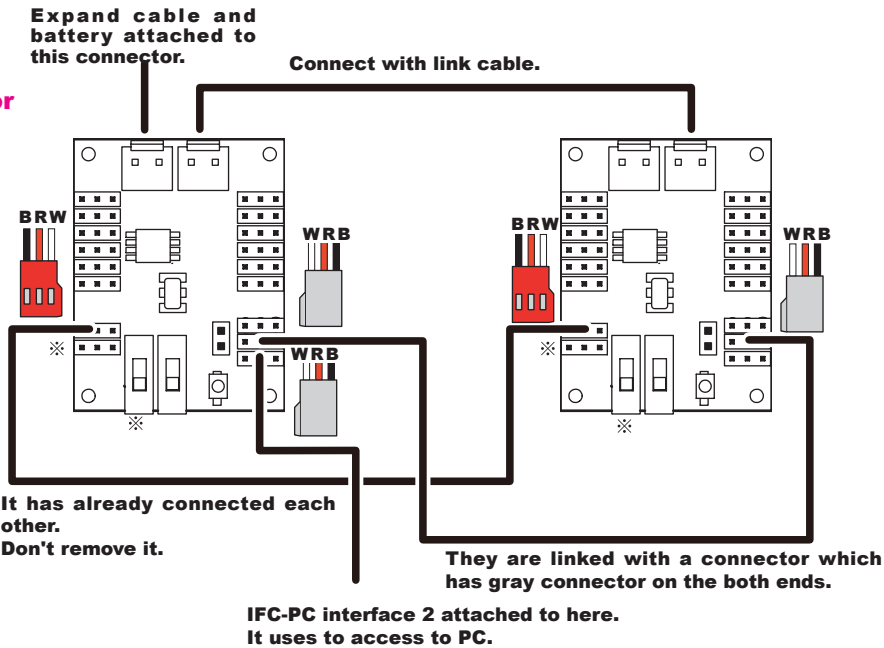
Attention

Direction and location of each connector must be attached right connector.

It may occur fire or serious damage if it failed.
Please confirm direction and location before power on.

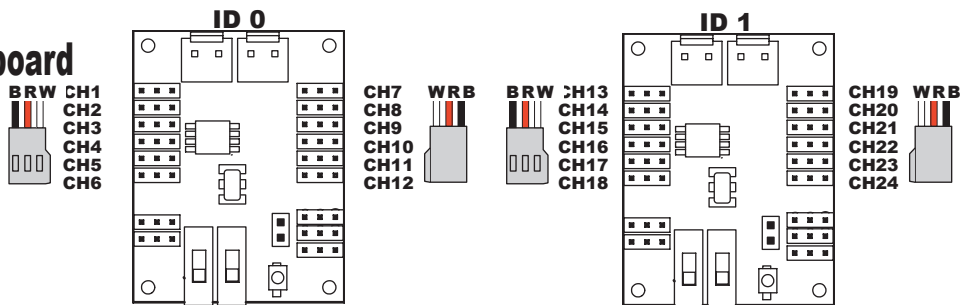
3 cables attached to connector are black, red and white. Black cable should be put on the outside of board. Please pay attention position of black cable to be contrary position on the right side or the left side of board. Both sides has black cables.

*This switch and connector will be attached optional controller.



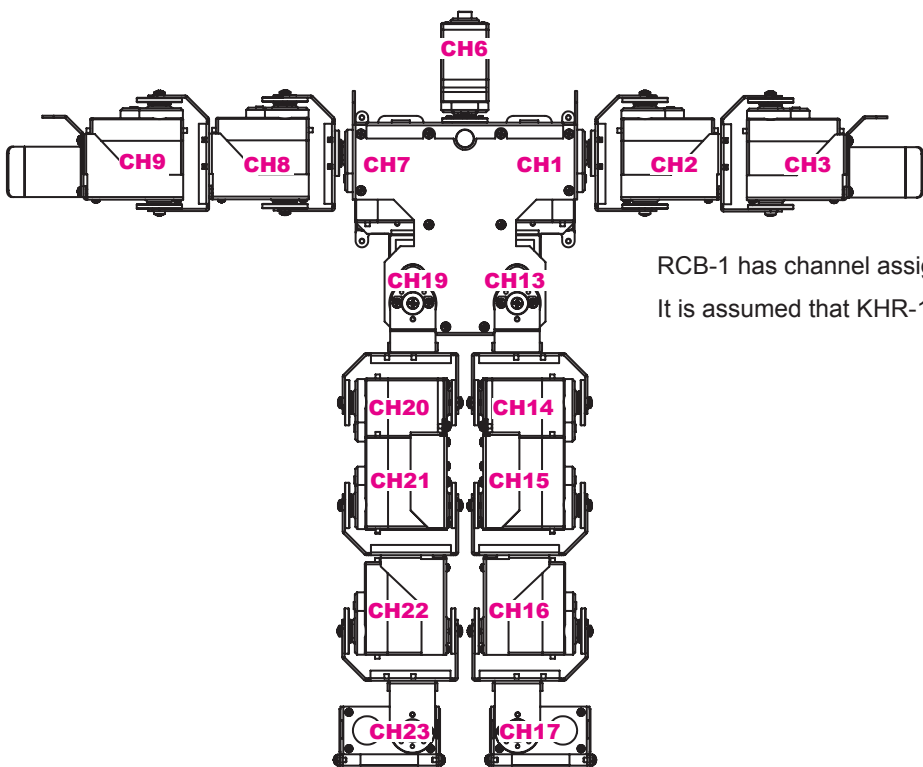
Connection Servo motor and board

CH is number of channel.



Pay attention to direction of connector to attach to the board pins and CH number.

Access to KHR-1



RCB-1 has channel assignment like left side figure to attach to KHR-1.
It is assumed that KHR-1 is used as application of this software after here.

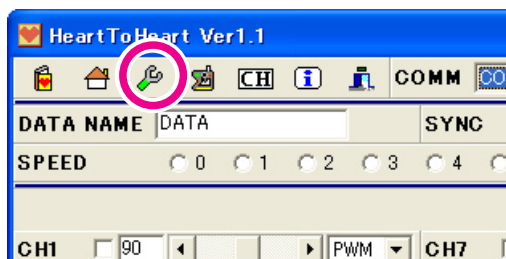
Trim function

What is trim function?

Servo motor axis is fixed by a servo hone using RCB-1 function to get neutral position. In this step, little gap of degree may occur. Especially, it causes large gap by difference degree of servo motors on the groin. Therefore, RCB-1 and software on PC can adjust little gap. This function is called "trim".

Operation of trim

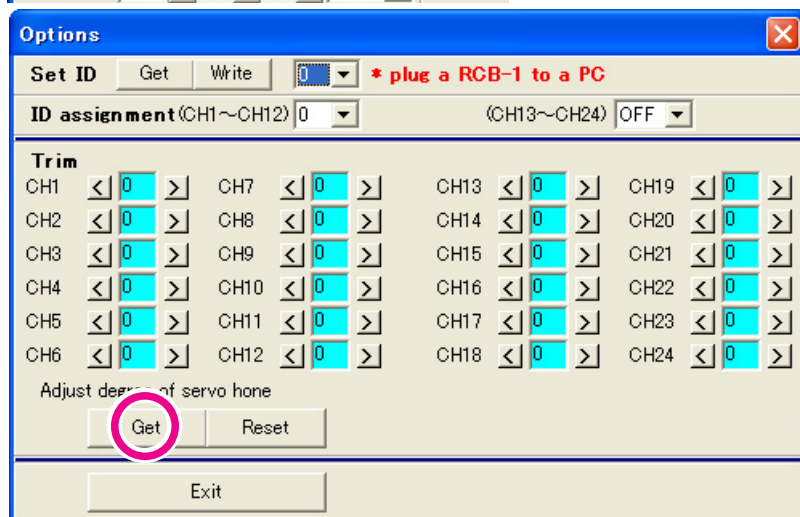
Start software and connect to RCB-1. Then RCB-1 are turned on.



1 Open "Option setting"



Click this icon to open "Option setting"



2 Click "get" button to get trim value from RCB-1 if they are set before. Each value can be controlled to each servo motor aixe on the channel.

* "get" operation must be operated at once.

* Trim value must be less value (within from -10 to 10.)

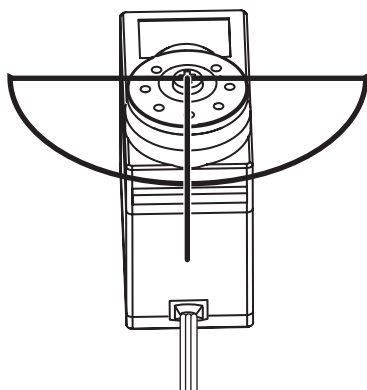
If greater value must be input here, you must take the robot apart and assemble again.

* "Initialize" button set all channels to be initialized value "0".

3 After adjustment, close option setting window.

All trim values are sent to RCB-1 at window closing.

Problem of trim



At first glance,trim function seems to be useful. However, it has effect to limit degree of rotation of servo motor axis if large value was set.

Refer to left figure. The range of servo motor axis rotates 180 degree.The range shows each 90 degree from center position. Trim value is minus from this degree which is adjusted. Therefore, maximum degree is limited if bigger value is set to trim.

**Settings are described after here.
And also, operation is described with sample
data.**

A p p l i c a t i o n

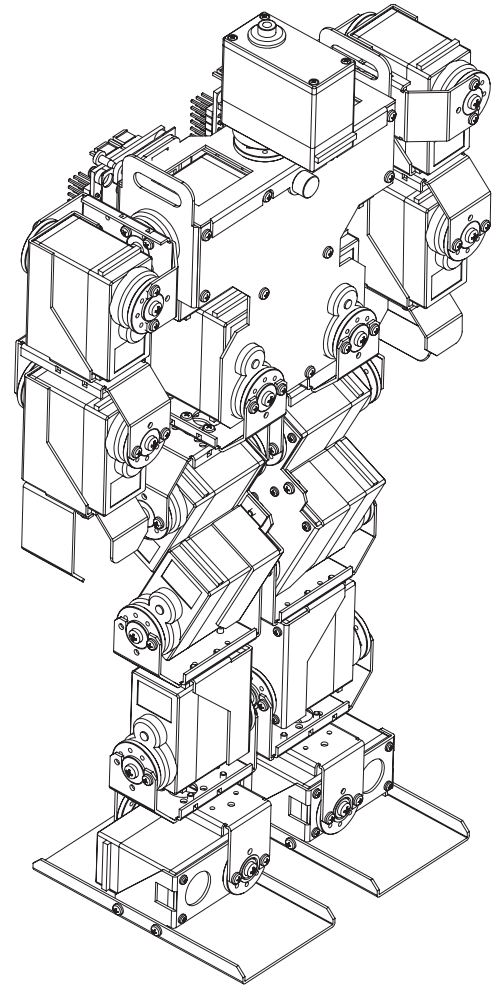
How to set Home position?

In the right figure, KHR-1 is set in home position.

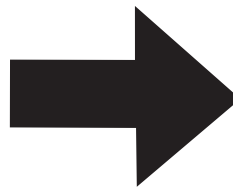
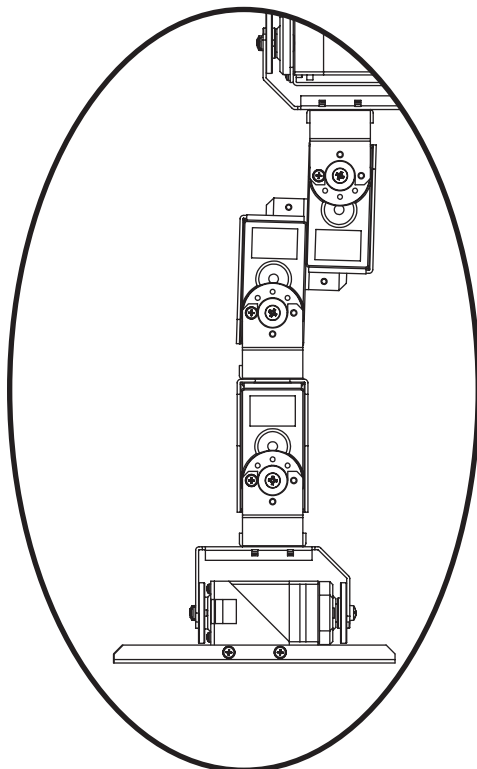
In the lower figure, we can see difference between initialized position and home position. In initialized position, center of gravity is set in backward. On the other hand, the center of gravity comes almost center of body in home position. It makes less current and less load for servo motor in home position.

In CD-ROM, sample home position is included. You can use this sample home position for your robot if your robot has no fault to assemble.

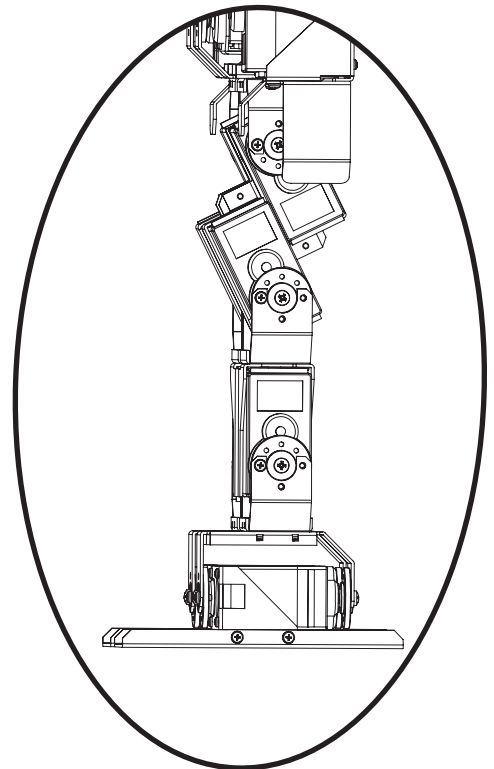
*In this manual, we have various sample motion. They are assumed that your robot has almost same home position which is described here.



Initial position



Home position



How to make new home position?

In this case, your robot spreads its arms and stands with two straight legs like cross. From this posture, we shall make new home position.

Make the new home position.

1 Read current position.
click (1) button in lower window. Current positions are read from RCB-1 to window. All values must be 90.

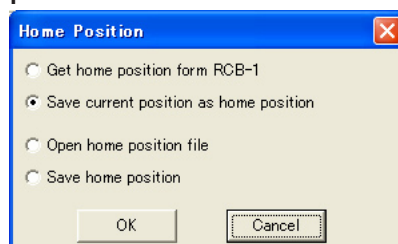
2 Set "SYNC" setting to "ON". This setting makes robot and slide bar working together in realtime.

*Transmitting data increases in SYNC mode. Please make it "OFF" if your computer is down or to be slow in this mode.

3 CH1,2 and CH7,8 are for arms. CH13-17 and CH19-23 are for legs. They should be moved for home position.
In the lower case, CH1=0, CH2=5, CH7=0, CH8=5 are set for arms to be dropped position.
CH14,15,16 and CH19,20,21 are set each servo hone to be in line.

*click (3) button to realize the motor value if you use "SYNC" off mode.

4 Click (4) button to set home position after setting.
Following dialog will be opened.

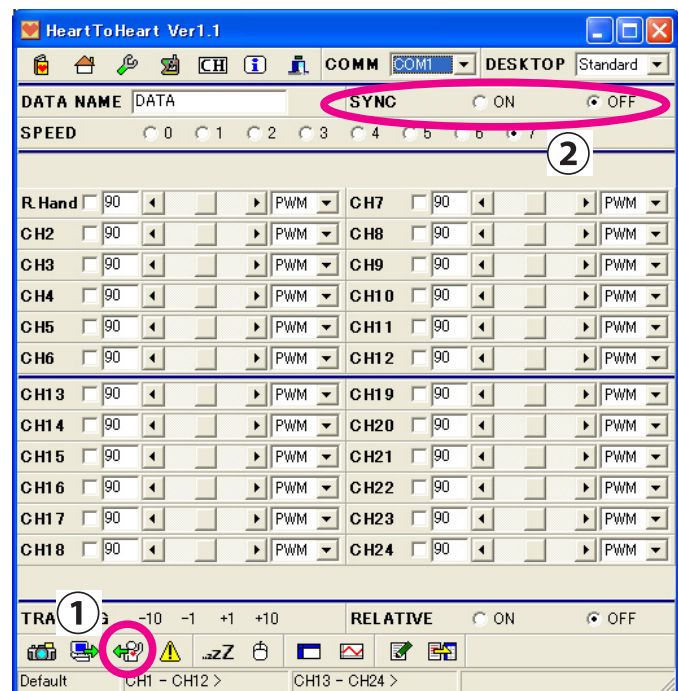


Click button in second line then click "OK" button.

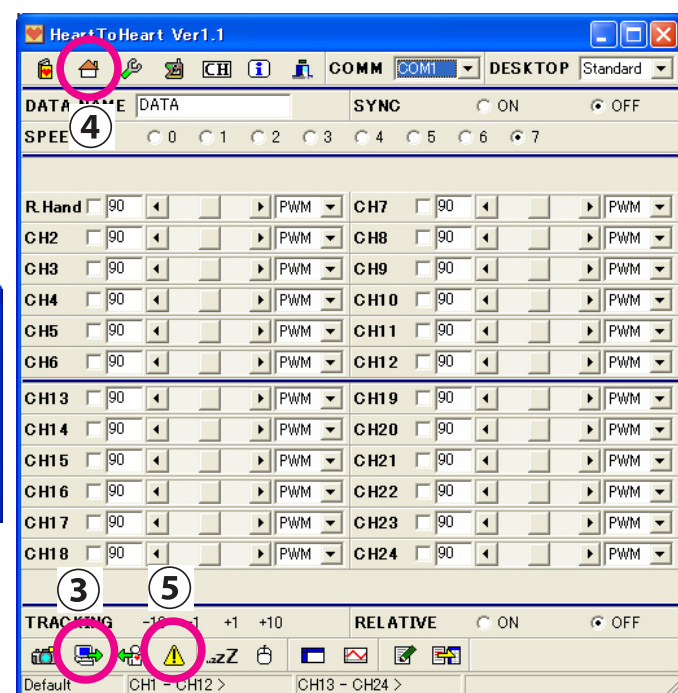
In this case, current home position will be recorded.
Save to RCB-1 is completed.

5 After setting, please confirm home position which is saved.
First of all, move any slide bar to set other position from home position.(click (3) button if you use "SYNC" off mode.)
Click (5) button to return to home position. At first click, all servo motors are set free.
Second click makes robot to be home position after dialog confirmed.

Original condition



Example of home position



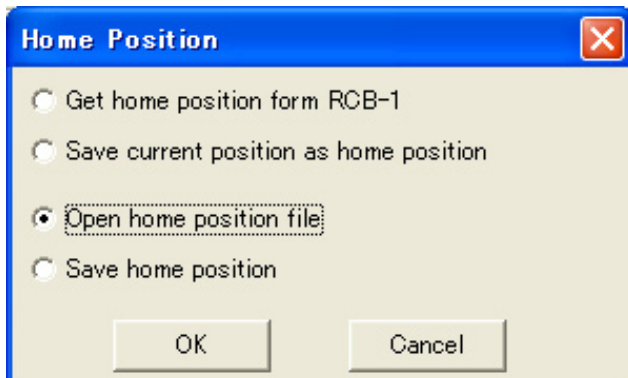
Watch robot movement in home position recovery operation.
It is danger that robot moves rapidly.

Setting home position from file

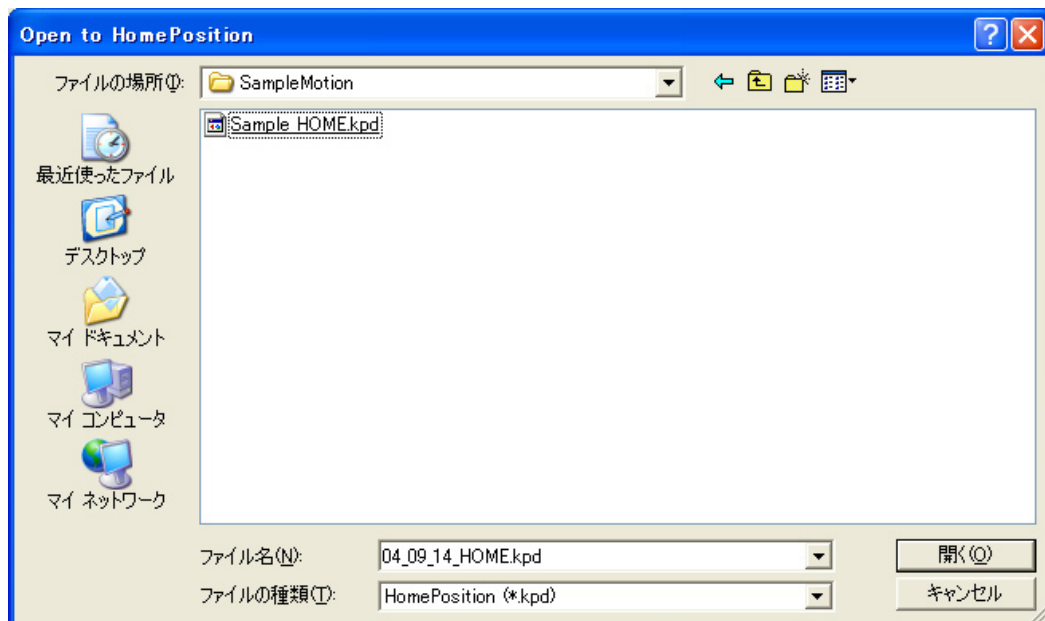
In this description, we introduce to set home position from file.

Set home position from sample data.

1 In main window, click "home position" icon to open dialog.



2 click "OK" button after selection of "open file" in the window. Next operation is selection of file. In this case, we select "Sample_HOME".



Note: This Display is Japanese Operating system. A display changes with languages of use.

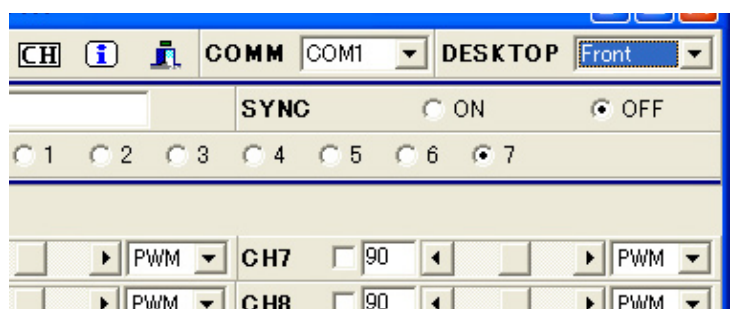
3 Selected data is displayed in the main window. According to "SYNC" mode, different procedure should be done.

Case "ON":

Robot forms the same posture according to the data in window.

Case "OFF":

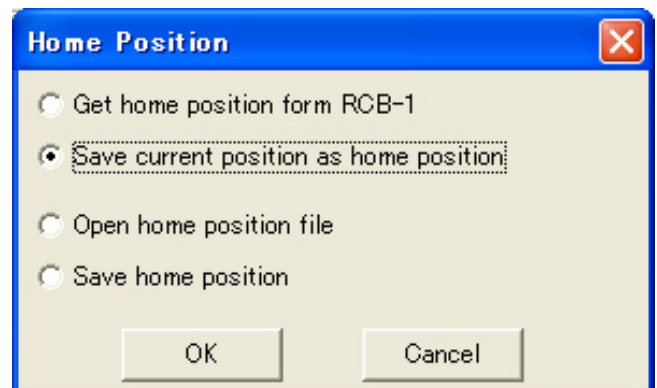
Click "Data Transmit" icon to send data to robot.



4 Save current position as home position.

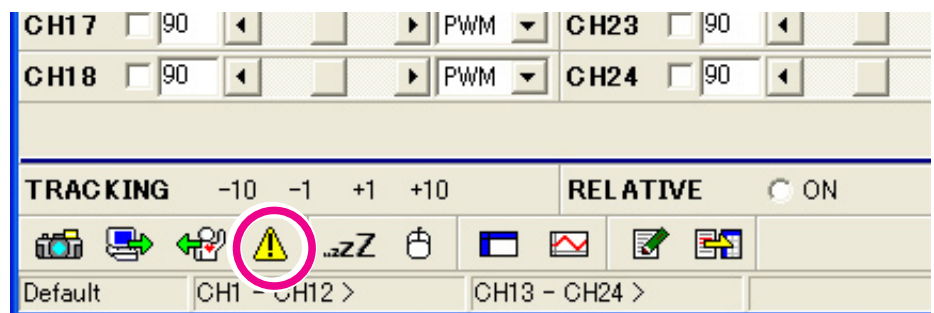
In this procedure we can see same position between robot and main window data.
But it is not home position in presence.

Click "home position" icon to open dialog.
Click "save current position as home position" in second line.



5 Confirm saved home position.

Move slide bar in main window and make different position.
SYNC mode is "ON": robot realizes same position in main window.
"OFF": click data transmit icon to set robot position to be the same as main window.



Click "home position" icon to return to home position.
Please confirm position which is set in upper procedure.

From position to motion (1) Data input

In this procedure, we set motion with positions.

- 1 **First, open main window. Then access to robot.**
Robot stands at home position.

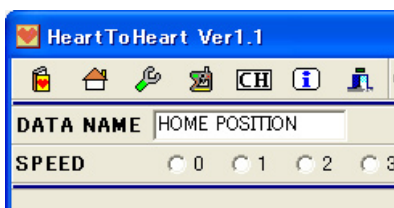
- 2 **Read data from RCB-1 to show data in main window.**



Read Data

Click button to read data from RCB-1. Window displays home position data.

- 3 **Save home position as 1st position data.**
In this sample, CH1 (left shoulder) is moved.



To recognize position, we can give name to position.
We put "home position" as name to the position.
And set speed 7 as latest movement.

- 4 **Edit motion data** **click motion data icon to open window.**



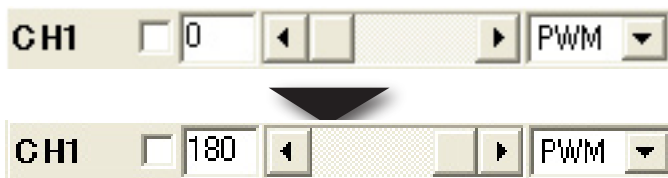
- 5 **Add data** **click "Add data" icon to add new data.**



NO	DATA_NAME	SPEED	CH1	CH2	CH3
1	HOME POSITION	7	90	90	90

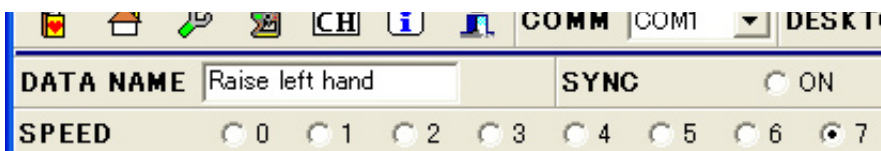
See added new data in motion data editing window.

- 6 **CH1** **Change CH1 data from 0 to 180**



Servo motor is worked together if "SYNC" is on.

- 7 **Change data name to "raise left hand" and set speed 7.**
click "add data" icon.



- 8 **Add data** **Click "Add data" icon to add new data.**



NO	DATA_NAME	SPEED
1	HOME POSITION	7
2	Raise left hand	7

Data was added. Two data in the window.

Motion is added by procedure from 1 to 8.

This is only operation on the software. Therefore, the data must be transmitted to robot to realize motion.

9 Confirm robot movement before transmission.

Set "SYNC" to "ON".

Double click position in the motion editing window.

Robot makes the same position in the main window.

After confirmation, let's transmit data to robot.

10



Set number to "Selection motion data number".
In this case, "M0" is set.

11



Click "Write" icon to save the data.

12



Click "play data" icon to confirm the transmitted data.

*In this case, home position is the first position. You feel nothing occur at first.
But you can see "raise left arm" after home position.

We recommend to save motion data to file.

***position names are not saved in RCB-1 (robot). But saved file records all data including name.**

***Saved data can be used as basement position when you make new position.**



Click "Save file" icon to open dialog.

You can set filename. Default setting of file name is "date+motion".



Click "open file" to read saved data from file.

From position to motion (2) Teaching

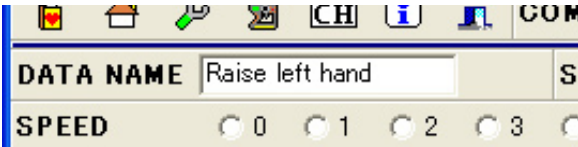
Teaching function is realized using RCB-1 and Red version servo motor.

What is "Teaching" ?

Mechanism of "servo" is set signal to go specified position. Sensor reads position data to know position. Send signal to motor if specified position is not satisfied. These procedure is repeated to set specified position. Traditional servo motor has signal sending function only. But Red version servo motor has signal sending/receiving function.

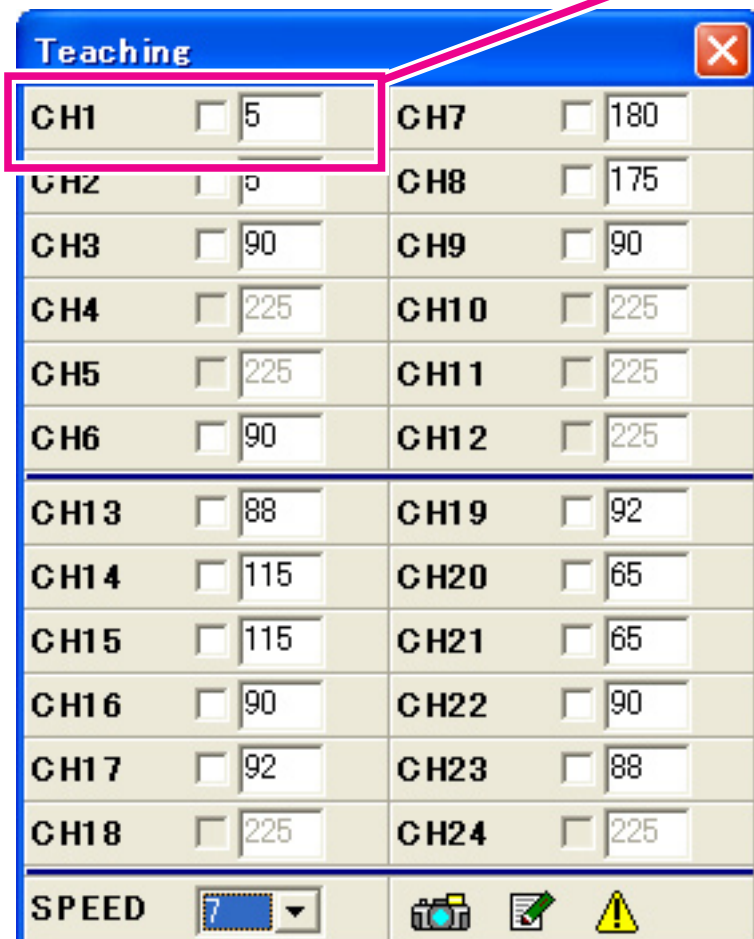
We call this function "position capture function". And also, Red version servo motor has "free" mode according to setting signal. Using this "free" mode, teaching function realizes movement of servo motor to know position of specified channel to set position.

- 1 Do procedure 1-5 in data input description to set home position.

- 2  Give a name to position. "raise left hand" is given here.
※This name is saved only in PC. "name" data can't set to robot.




- 3  **"Shot" icon.** It opens "teaching window".


4 Teaching window



Teaching	
CH1	<input type="checkbox"/> 5
CH2	<input type="checkbox"/> 0
CH3	<input type="checkbox"/> 90
CH4	<input type="checkbox"/> 225
CH5	<input type="checkbox"/> 225
CH6	<input type="checkbox"/> 90
CH7	<input type="checkbox"/> 180
CH8	<input type="checkbox"/> 175
CH9	<input type="checkbox"/> 90
CH10	<input type="checkbox"/> 225
CH11	<input type="checkbox"/> 225
CH12	<input type="checkbox"/> 225
CH13	<input type="checkbox"/> 88
CH14	<input type="checkbox"/> 115
CH15	<input type="checkbox"/> 115
CH16	<input type="checkbox"/> 90
CH17	<input type="checkbox"/> 92
CH18	<input type="checkbox"/> 225
CH19	<input type="checkbox"/> 92
CH20	<input type="checkbox"/> 65
CH21	<input type="checkbox"/> 65
CH22	<input type="checkbox"/> 90
CH23	<input type="checkbox"/> 88
CH24	<input type="checkbox"/> 225

SPEED



CH1 ☐ 5


it displays same data on main window.

Free setting check box
servo motor set "free" if it is checked.


Label:The same label name in main window is shown.


Speed
SPEED

It is the same function in main window.
It set motion speed.

Shot icon


It returns servo motor position from FREE mode if the channel has checked box.
And also, it revises data in main window at once.

 **Add data** Displayed data is added to motion editing window.

 **Home position** First click makes all servo motors to be free.
Second click requires click in dialog box, then robot forms home position.

5 Operation in Teaching window.

When teaching window open, other windows can't be operated.

Close teaching window if you want to operate value in other editing window.



Check Free setting check box to get data using teaching function. You can check plural channels at the same time.



Pay attention: It is difficult to stand if you set almost servo motors to be free.

Servo motor is set free when you check the box. Then you put servo motor on the robot to specified position which you want.



We have two method to read specified position of channel.

① •remove check from check box. Software fixes the data at the position.



② •lick shot icon. All checked channels are read at once. Then all data is clear. Signals are fixed at the position.



*Servo motor is set free in the position if you set free to check box.



In the case to add position data to motion, click data add icon.



In the case to set home position as basement position to make new position, click home position icon.



Main window can be operated when teaching window is closed. Main window data inherited data in teaching window. Servo motor will be free if you set any servo motor to be free and close teaching window.

Here after, it is the same operation from 10 to last in data input (previous description). Please confirm robot motion using motion editing window after data transmission to RCB-1.

Edit Scenario

Scenario data can be edited after motion data transmission to RCB-1. Scenario can't be edited if RCB-1 doesn't have any motion data.

- 1** click "Read all motion data" to get motion data in RCB-1.



Data name is required to read motion. Dialog is displayed to give a name.

Input DATA NAME
Cancel updates nothing with data name

OK Cancel

During communication, RCB-1 set sleep mode to output OFF to servo motors.
Confirmation box will be shown to return to ordinary mode at the end of communication.

Information
Get data finished Release sleep mode by OK button click

OK Cancel

In this case, saved motion is only one like right side figure.

INDEX :M0
DATA NAME :TEST0
COUNT :2

INDEX: M0
motion number
DATA NAME: TEST0
specified name + number
COUNT: 2
number of positions which are saved in the motion.

Edit Scenario Data

Motion data list

INDEX	DATA NAME	COUNT
-------	-----------	-------

Scenario data

NUMBER	MOTION	DATA NAME
--------	--------	-----------

DATA > 0

Edit Scenario Data

Motion data list

INDEX	DATA NAME	COUNT
M0	Test0	2
M1	None	0
M2	None	0
M3	None	0
M4	None	0
M5	None	0
M6	None	0
M7	None	0
M8	None	0
M9	None	0
M10	None	0
M11	None	0
M12	None	0
M13	None	0
M14	None	0
M15	None	0
M16	None	0
M17	None	0
M18	None	0
M19	None	0
M20	None	0
M21	None	0
M22	None	0
M23	None	0
M24	None	0
M25	None	0
M26	None	0
M27	None	0

Scenario data

NUMBER	MOTION	DATA NAME
--------	--------	-----------

DATA > 0

2 Drug and drop motion from all motion data to scenario window.

Scenario data			
DATA NAME	COUNT	NUMBER	MOTION DATA NAME
Test0	2		
ne	0	M0	Test0
ne	0		
ne	0		
ne	0		

In this case, motion data saves "raise left hand".

Scenario data			
DATA NAME	COUNT	NUMBER	MOTION DATA NAME
Test0	2	1	M0 Test0
ne	0		
ne	0		
ne	0		
ne	0		

3 Transmit data to RCB-1 to save scenario to robot.

Edit Scenario Data						
Motion data list			Scenario data			
INDEX	DATA NAME	COUNT	NUMBER	MOTION	DATA NAME	
M0	Test0	2	1	M0	Test0	
M1	None	0	2	M0	Test0	
M2	None	0				
M3	None	0				
M4	None	0				
M5	None	0				
M6	None	0				
M7	None	0				
M8	None	0				
M9	None	0				
M10	None	0				
M11	None	0				
M12	None	0				
M13	None	0				
M14	None	0				
M15	None	0				
M16	None	0				
M17	None	0				
M18	None	0				
M19	None	0				
M20	None	0				
M21	None	0				
M22	None	0				
M23	None	0				
M24	None	0				
M25	None	0				
M26	None	0				
M27	None	0				



Click "write" icon to transmit scenario.

*During transmission, robot will be set "sleep" mode. After transmission, dialog opens to confirm to return ordinary mode.



You can choose data number for scenario to save. In this case, we choose "S0".



Click "play" icon to confirm scenario.



Click "save file" to open dialog box to specified file name to save. Default setting of filename is "date+SINARIO".



click "open file" to read saved file.

Optional controller

Robot can perform with transmitted data. Optional controller makes it easy to play with robot. Optional controller will be in sale in the future. It can control two methods.

- **Wired control:** Optional controller and RCB-1 are connected with cable.
- **Wireless control:** Optional controller sends signals using transmitter to receiver on the robot.

Both cases, the same format of data is used.

RCB-1 performs according to scenario or motion which is set by optional controller.

 Click "optional controller" in main window to open the setting window.


Description of setting window.

 **Open file:** read data in saved file.


 **Save:** save data to file.

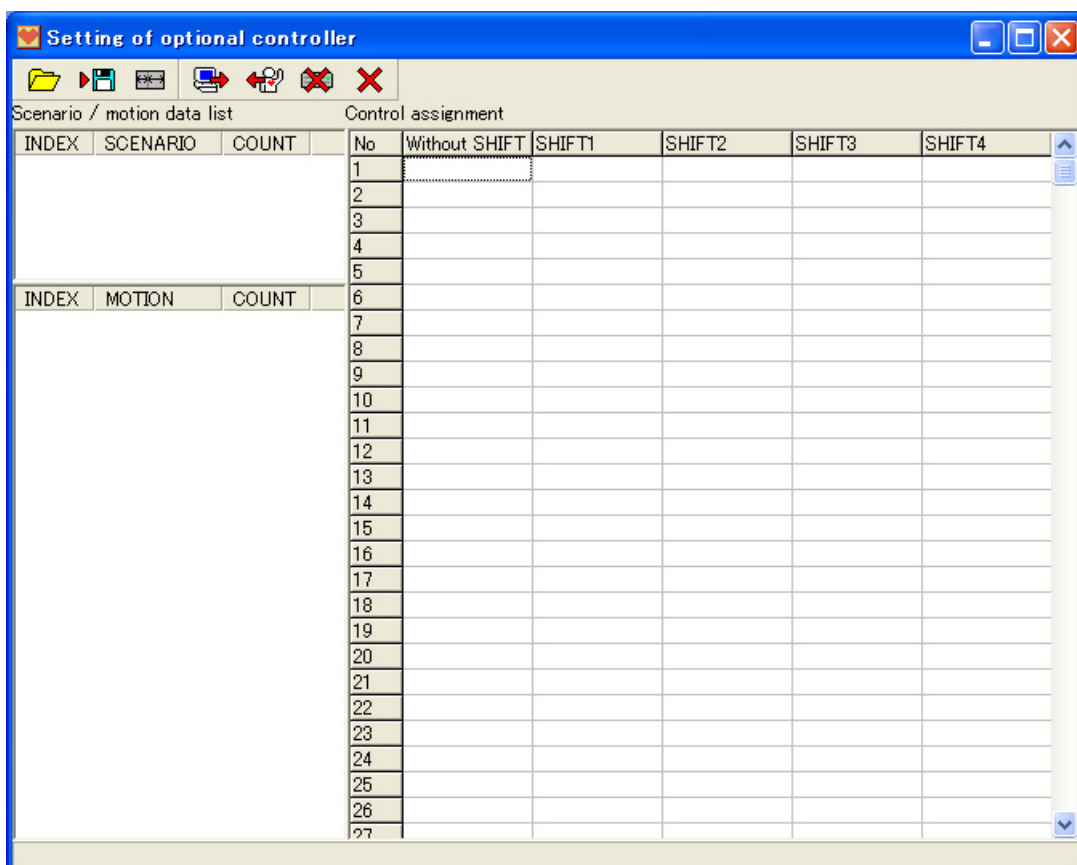
 **Initialize width:** It returns initialized width from revised display width.

 **Write:** Set data to RCB-1.

 **Read:** Read data from RCB-1.

 **Initialize:** It initializes from current settings.

 **Delete:** It deletes selected settings.




The window titled "Setting of optional controller" contains two main sections. The top section, "Scenario / motion data list", has columns for INDEX, SCENARIO, and COUNT. The bottom section, "Control assignment", has columns for INDEX, MOTION, COUNT, and four shift columns: No, Without SHIFT, SHIFT1, SHIFT2, SHIFT3, and SHIFT4. The table is currently empty.

Control assignment

In control assignment, motion or scenario can be assigned with key. key consists of 8 command keys and 4 shift keys.

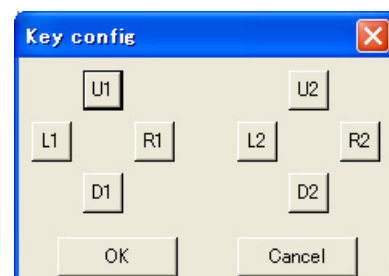
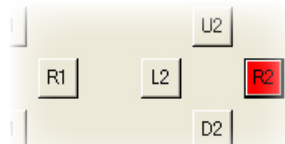
Shift key makes combination motion with command key. In assignment window, column shows combination with shift key (nothing, 1, 2, 3, 4). It can specify 32 combination in each column. It can set $32 \times 5 = 160$ performance (motion or scenario).

1  Read motion and scenario data from RCB-1 using "Read" icon.

2 Drag and drop motion or scenario to set to assignment window.

3 double click setting assignment to open window like right figure. It changes color when it is assigned. You can set plural keys at the same.

Electrical characteristics and signal settings are described in technical manual in the case of control from outside.

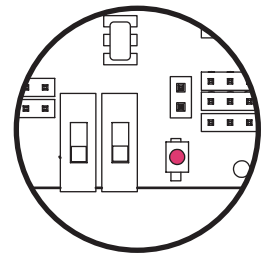


Auto demonstration

RCB-1 has auto demonstration mode. It plays saved data in scenario bank 0.

1 Save scenario or motion to play auto demonstration mode referring to procedure.

2 A start button on a board turns on to start even if you use 2 boards.
Push start button red LED off then turn on red LED.
It takes about 2 seconds.



Start Switch

3 Robot plays scenario 0.
It plays one time (not repeat).

NOTICE

Wrong case

Scenario data consists of enumerate motion data in control board.
There is wrong case that robot performs unspecified motion.

●**After transmission of scenario and motion to robot, only motion data is renewal and transmitted. Or motion data is deleted.**

Override or deleted motion in scenario, latest motion will play.
In this case, scenario must be revised using latest motion.

Home position must be same in the case to use motion data in PC.
It is the reason that data is relative to home position.
It is required to save home position data to RCB-1 and software.

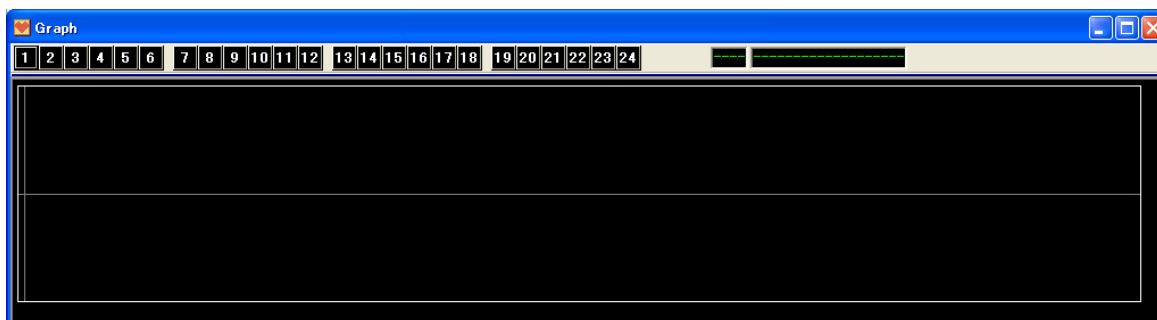
●**At least one time, home position data should be read from robot before save/read data to/from PC.**

How to use Graph window?

 **Movement of servo motor of motion data can be confirmed using graph window. Graph window can be opened by click "graph window" icon.**

At beginning, less positions are saved to motion. Increasing position data, positions makes gap or wrong revision. In this case, graph can show what is problem in the positions.

Graph window

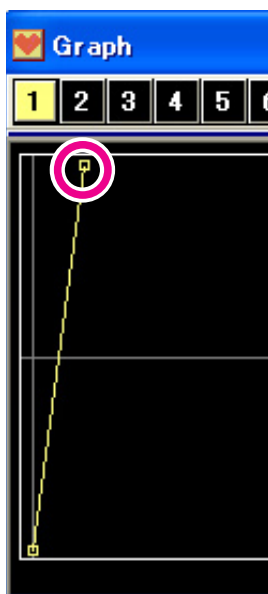


Graph window shows data of each servo motor in motion editing window. There is no data at initialization because of no active channels.



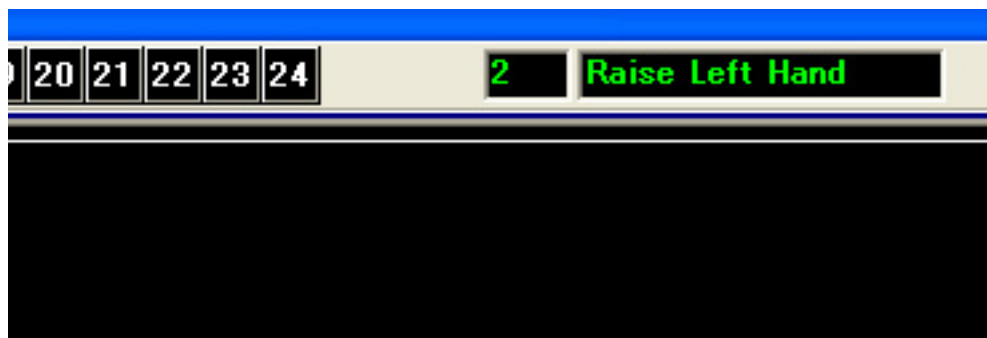
Each number shows channel. Click channel number to activate to show data in specified color. Click active number not to display.

Color is set using setting which is specified label property in the main window.



In the left case, CH1 is yellow.

Motion shows each position with □. Position and name are displayed when



How to tile setting windows?

Three windows besides of scenario window, they can be tiled.
Their location are saved at once. The same location is set from next start.

The image shows three software windows tiled together. The top-left window is 'HeartToHeart Ver1.1', the top-right is 'Edit motion data', and the bottom is 'Graph'.

HeartToHeart Ver1.1 window details:

- DATA NAME: Raise Left Hand
- SYNC: ON
- SPEED: 7
- Channels (CH1-CH24) with position and direction settings.
- TRACKING: -10 -1 +1 +10
- RELATIVE: OFF
- Status bar: Default | CH1 - CH12 > Success | CH13 - CH24 > Success

Edit motion data window details:

NO	DATA_NAME	SPEED	CH1	CH2	CH3	CH4	CH5	CH6	CH7
1	HOME POSITION	7	0	5	90	225	225	90	180
2	Raise Left Hand	7	180	5	90	225	225	90	180

Graph window details:

- Timeline: 1 to 24
- Current selection: 2 Raise Left Hand
- Graph area: A coordinate system with a yellow line starting at the origin and extending upwards.

Label property and DESKTOP (1)

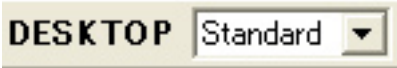
"Label property" and "DESKTOP" set settings of display of servo control.

Settings of DESKTOP

It can move by drag and drop at region of label or space in the window.

Originally, servo control is tiled in order to channel number.

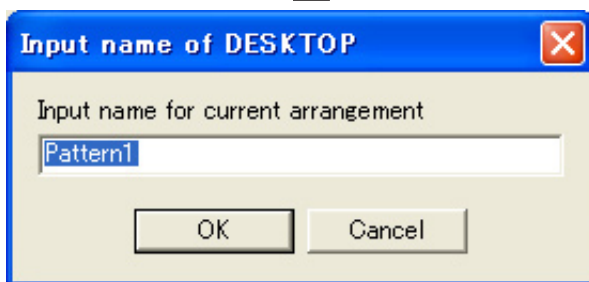
You can set the same assignment to robot and channels such as view from front or view from back.

 Change selection "default" to another if you want to change control position.
You can give a name to click right button on the DESKTOP combo box.

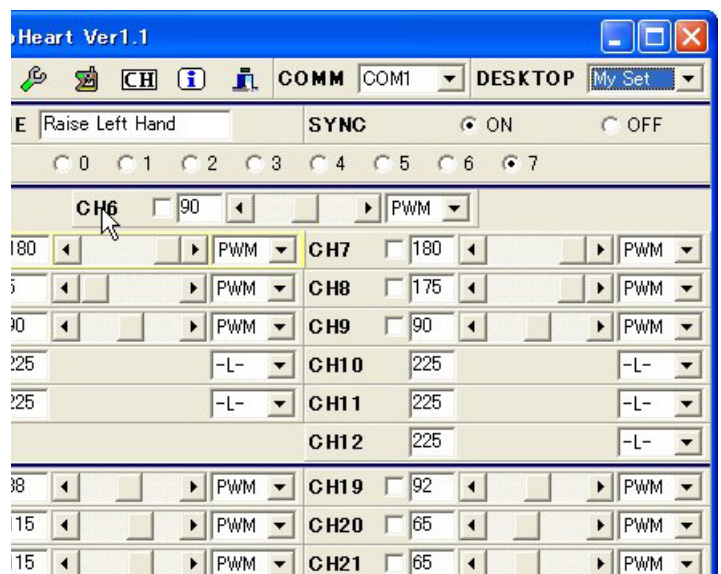
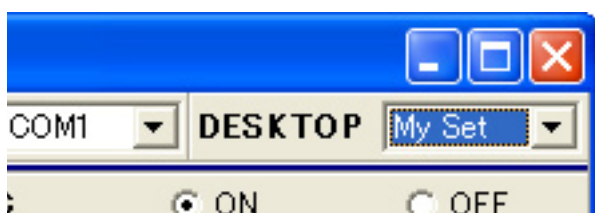
Change



 Input name using right button click to open the window to input.



In the following case, CH6 is moved using drag.



- **Setting is saved automatically. Next start is same window setting.**
- **Assignment can't set if "standard" is selected.**
- **10 assignment can be saved.**

Label property and DESKTOP (2)

How to open label property?

There are two methods to open label property.

1 

Click "label property" icon in the main window to open label property window.



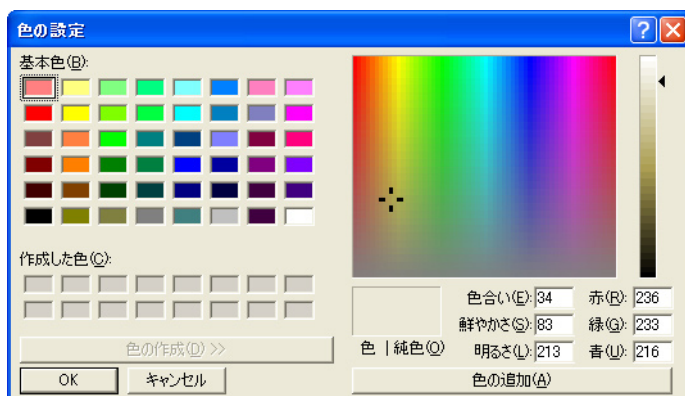
2  90 ◀ ▶ PWM ▼

Double click at region label of servo control or space to open label property window.

Setting of label property

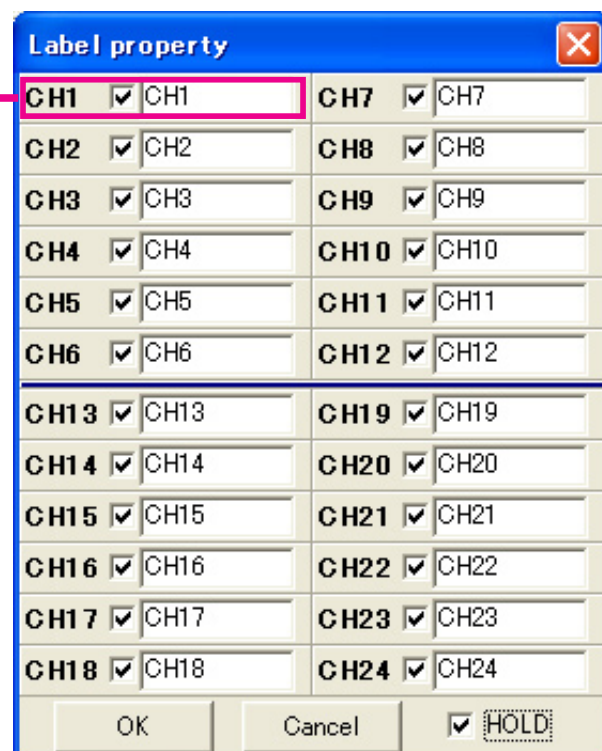


- ① Channel name
Color setting will be opened if double clicked here.
It sets background color.
Specified color is used for main window and graph window.



Note: This display is Japanese version. A display changes with languages of use.

- ② It is not displayed on the main window if this check box is removed.



- ③ Input name to show channel label. The name is shown in main window and motion window.

Label property and DESKTOP (3)

Following window display is the sample of setting label property. Each channel has different name and color settings from standard.

The screenshot displays the 'HeartToHeart Ver1.1' software window. The interface includes a top menu bar with icons for file operations, a 'CH' button, an information icon, and a printer icon. The 'COMM' dropdown is set to 'COM1' and the 'DESKTOP' dropdown is set to 'My Set'. Below the menu bar, there are controls for 'DATA NAME' (set to 'DATA'), 'SYNC' (radio buttons for ON and OFF, with OFF selected), and 'SPEED' (radio buttons for 0 through 7, with 7 selected). The main area contains 24 channel settings, each with a unique color and name: CH6 (blue), CH1 (red), CH7 (cyan), CH2 (green), CH8 (magenta), CH3 (light blue), CH9 (dark purple), CH13 (yellow), CH19 (pink), CH14 (orange), CH20 (light green), CH15 (dark green), CH21 (blue), CH16 (dark blue), CH22 (light pink), CH17 (purple), and CH23 (light blue). Each channel has a checkbox, a value of 90, and a 'PWM' dropdown. At the bottom, there are 'TRACKING' controls with values -10, -1, +1, +10, and 'RELATIVE' radio buttons (ON and OFF, with OFF selected). The bottom status bar shows 'Default', 'CH1 - CH12 >', and 'CH13 - CH24 >'.

HeartToHeart Ver1.1

COMM COM1 DESKTOP My Set

DATA NAME DATA SYNC ☐ ON ☒ OFF

SPEED ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7

CH6 ☐ 90 PWM

CH1 ☐ 90 PWM CH7 ☐ 90 PWM

CH2 ☐ 90 PWM CH8 ☐ 90 PWM

CH3 ☐ 90 PWM CH9 ☐ 90 PWM

CH13 ☐ 90 PWM CH19 ☐ 90 PWM

CH14 ☐ 90 PWM CH20 ☐ 90 PWM

CH15 ☐ 90 PWM CH21 ☐ 90 PWM

CH16 ☐ 90 PWM CH22 ☐ 90 PWM

CH17 ☐ 90 PWM CH23 ☐ 90 PWM

TRACKING -10 -1 +1 +10 RELATIVE ☐ ON ☒ OFF

Default CH1 - CH12 > CH13 - CH24 >

Sample motion is introduced.

S a m p l e m o t i o n

Sample motion

Sample motion is saved in CD-ROM.

There is no guarantee of this sample motion.
It is required to revise positions because sample motion is set using factory robot.
Depending on the home position of your robot, please adjust positions.

In this procedure, sample motion transmission to robot and operation are described.

PC and RCB-1 (robot) are connected each other using IFC-PC interface 2.
Battery is mounted to the robot. PC starts software.

- 1 Home position is important to use sample motion. Sample motion can't work well if home position is wrong. Please fix home position of your robot if sample motion can't perform well.

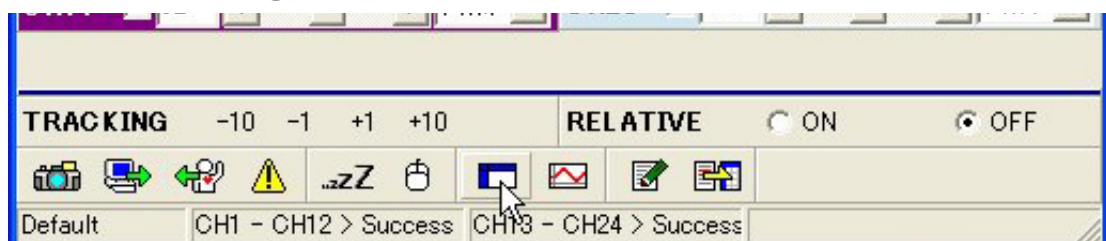
All servo motor position is 90 in main window at first.
Home position is made from this basement position.
Please refer to following sample data to set each channel.

CH1	5	CH7	175
CH2	0	CH8	180
CH3	90	CH9	90
CH6	90		
CH13	88	CH19	92
CH14	115	CH20	65
CH15	115	CH21	65
CH16	90	CH22	90
CH17	92	CH23	88

※These values are reference data.

- 2 After confirmation of home position, open the motion editing window from main window.
Open sample motion using "Open file". "Sample_FWD" is used for sample.
This file includes "walk forward".

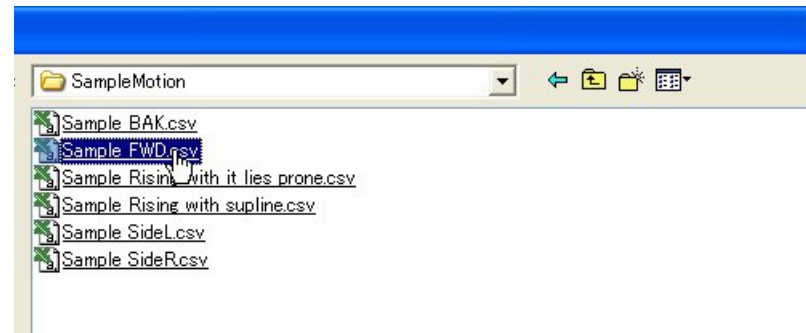
Open motion editing window.



3 Open file to read sample data.



4 Select "Sample_FWD" from SampleMotion folder in CD-ROM.



5 Sample data is displayed.

Position can be revised by double click at each position or click right button to select edit. Robot can work together with data revision if "SYNC" is on.

NO	DATA_NAME	SPEED	CH1	CH2	CH3	CH4	CH5	CH6	CH7
1	DATA	4	4	16	90	225	225	90	180
2	DATA	5	4	16	90	225	225	60	180
3	DATA	3	4	16	90	225	225	60	180
4	DATA	3	0	16	90	225	225	90	155
5	DATA	6	4	16	90	225	225	120	155
6	DATA	3	4	16	90	225	225	120	180
7	DATA	3	25	16	90	225	225	120	180
8	DATA	6	25	16	90	225	225	90	180

6 Send motion data to robot.



Click "Write" icon after specified motion number to save.

During transmission, each servo motors will be set free. Please pay attention to robot to be down. After transmission, dialog box confirms to return to ordinary mode of robot.



Set the motion number

7 Saved motion plays by click "play" icon.



The motion plays according to specified motion number.

Please confirm the number if the robot performs different motion.

NO	DATA_NAME	SPEED	CH1	CH2	CH3	CH4	CH5	CH6	CH7
1	DATA	4	4	16	90	225	225	90	180
2	DATA	5	4	16	90	225	225	60	180
3	DATA	3	4	16	90	225	225	60	180
4	DATA	3	0	16	90	225	225	90	155
5	DATA	6	4	16	90	225	225	120	155
6	DATA	3	4	16	90	225	225	120	180

*All motions are played at once. It can't stop in the middle of motion.

*Please robot works on the wide open space. Robot may occur injury or damage by down or wrong performance.

Please transmit to other motion to other motion number as the same procedure. You can make continuous motions using scenario and auto demonstration.

